IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Joel A. Schwartz	Art Unit	: 3609
Serial No.	: 10/798,682	Examiner	: Branon C. Painter
Filed	: March 11, 2004	Conf. No.	: 6249
Title	: RIGID INSULATION PRODUCT		

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL

Appellant is appealing the rejection of claims 1, 3-10 and 13-23 in the Final Office Action of May 14, 2008. Applicant requests that the rejections be reversed.

(1) Real Party in Interest

Joel A. Schwartz.

(2) Related Appeals and Interferences

There are no related appeals or interferences.

(3) Status of Claims

Claims 1, 3-10, and 13-42 are pending. Claim 24-42 have been withdrawn. Claims 1, 3-10, and 13-23 stand rejected. Appellant is appealing the rejections.

(4) Status of Amendments

All amendments have been entered.

(5) Summary of Claimed Subject Matter

Joists are horizontally-extending beams used in wood frame construction to support floors. The ends of joists are attached to a framing member called a joist header that extends in a direction perpendicular to the joists. The ends of a series of parallel joists are generally attached

to a single joist header. It is common to insulate the joist header between the joists (page 1, lines 11-19):

> The builder then cuts pieces of fibrous insulation, e.g., glass fiber insulation, or rigid insulation to fit between each joist to insulate the joist header and prevent air infiltration. In some cases, the builder will caulk along the cracks between the rigid insulation, joists and joist header. Occasionally, the builder will spray foam insulation, e.g., a sprayable polyurethane, into these cracks and other spaces where there is no rigid insulation. With the exception of the latter construction practice, the 7" to 13" of wall height at the ends of joists tend to provide poor thermal protection, e.g., due to improperly installed glass fiber insulation that sags, air leakage through the fibers of fibrous insulation, or air leakage around cracks between pieces of rigid insulation and the floor joists where they meet the joist header.

The invention features a unitary insulation member that is used to insulate joist headers. Referring to Fig. 1, rigid insulating member 11 has a length L (typically 4' to 24') and a height H selected to match the height of typical joist headers (e.g., 7.15', 9.25', or 11.25') (p. 4, line 19-p. 5, line 3):

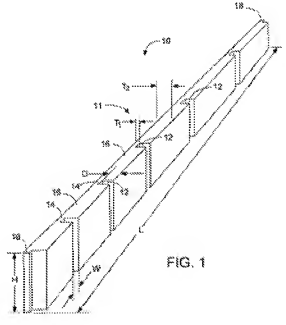

FIG. 1

Rigid insulating member 11 includes a plurality of slots 12 having a width W that generally matches the width of manufactured joists. See page 4, line 27-page 5, line 16. As appellant explains (page 2, lines 5-12):

> The rigid insulation products discussed above act as an air barrier to prevent or inhibit air infiltration over the tops of foundation walls between floor joists and over the tops of wood framed walls with wood floor joists. The rigid insulation products can be quickly and easily installed without cutting and fitting and without the need for additional steps such as caulking or spraying of foam insulation. The products also provide a guide for installing joists on uniform centers, simplifying construction, reducing errors in measurement and speeding floor joist layout during construction. If desired, the builder can easily cut additional slots for joists that are not on center, e.g., using a hot wire blade or knife.

There are two independent claims on appeal. Claim 1 covers the rigid insulating members shown in Fig. 1:

> 1. A rigid insulation product for use in wood frame construction, comprising a single unitary insulating member formed of a single **rigid cellular insulating material having substantially uniform rigidity**, dimensioned to be mounted lengthwise on a joist header and including a plurality of slots extending width-wise into the single rigid insulating material across one side of the member, each slot being dimensioned to receive an end of a floor joist, the member including a wall, at the base of each slot, having a thickness of at least about 0.375 inch and less than about 1.0 inch, and the member having a thickness, in regions between the slots, of from about 1.0 to about 3.0 inches.

The language "rigid cellular insulation material having substantially uniform rigidity" is shown in boldface in claim 1. This language will be the focus of the appeal of the rejection of claim 1. "Rigid cellular insulating material" is being used in its ordinary and accustomed sense in the building trades to encompass stiff, inflexible closed-cell materials having only minimal amounts (less than about 10%) of open cells. See, e.g., page 3 of Exhibit 1 (rigid polyurethane form has 95% closed cell content) and page 4 of Exhibit 2 (rigid cellular plastics should have maximum of 8% open cell content); see also Exhibits 3 and 4 (general definitions from Merriam-Webster online and Dictionary.net, respectively, of the term rigid). The language "having substantially uniform rigidity" merely means that the rigidity of the insulating material is the same throughout the member.

Claim 13, the second independent claim, reads as follows:

13. A rigid insulation product for use in wood frame construction, comprising:

a single unitary thermal insulating member comprising a **rigid** cellular insulating material **having substantially uniform rigidity**, including a plurality of slots extending width-wise across the member on a first side of the member, each slot being exposed to receive an end of a floor joist; and

a wood member, **configured so that the wood member will function as a joist header in a wood frame construction**, bonded to the insulating member on a second side of the member opposite the first side.

Claim 13 differs from claim 1 in that it covers a product including an insulating member including the rigid insulating material and a wood member, bonded to the insulating member, that is "configured so that the wood member will function as a joist header." The limitations "rigid", "having substantial uniform rigidity", and "configured so that the wood member will function as a joist header" are shown in boldface in claim 13 because they will be the focus of the appeal. "Configured so that the wood member will function as a joist header" is self-explanatory -- the wood member is sized so that it can function as a joist header.

(6) Grounds of Rejection to be Reviewed on Appeal

Claims 1, 3-5, and 7-9 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Grinshpun et al., U.S. Pat. 6,226,943 ("Grinshpun").

Claims 6, 13-20, 22, and 23 have been rejected under 35 U.S.C. § 103(a) as obvious over Grinshpun in view of Charlson, U.S. Pat. 6,125,608 ("Charlson").

Claim 10 has been rejected under 35 U.S.C. § 103(a) as obvious over Grinshpun in view of Berdan, II, U.S. Pat. 6,042,911 ("Berdan").

Finally, claim 21 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Grinshpun in view of Charlson and Berdan.

Appellant requests reversal of all of the 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) rejections.

Appellant will be addressing only the rejections of independent claims 1 and 13. The dependent claims are patentable at least for the same reasons that the base independent claims are patentable.

(7) Argument

(A) Claim 1 is not anticipated under 35 U.S.C. § 102(b) over Grinshpun

Appellant will first discuss Grinshpun and then will explain why the 35 U.S.C. § 102(b) rejection of claim 1 based on Grinshpun should be reversed.

Grinshpun is directed to an insulating polymer foam sheet including a plurality of grooves. The sheet is large; Grinshpun uses the sheet to insulate entire walls. The walls include vertically-extending structural members -- generally wooden studs -- that run from floor to ceiling. The grooves extend along the vertical length of the sheet. In use, the sheets typically are mounted between the exterior of the building and the support frame for the wall. The studs are pushed into the grooves at some point during assembly.

Importantly, at least a portion of Grinshpun's foam sheet, adjacent the groove, is "compressible and resilient." In fact, Grinshpun divides foams into two categories: (1) "flexible and resilient", and (2) "rigid." Grinshpun even provides a test for distinguishing "flexible and resilient" foams from "rigid" foams (col. 5, lines 26-34):

> A "compressible and resilient" foam as used herein means that an applied load of 15 psi will compress and deform a 4-inch thick section of the foam by at least 10 percent, but that such deformation is at least 80 percent reversible when the load is removed. Further, the term "rigid" foam as used herein means that a 15-psi load will compress a 4-inch thick sample of the foam by less than 10 percent, according to ASTM Test No. D-161-94.

Grinshpun teaches that foams including greater than 20% open cells should be used to achieve the desired compressibility and resiliency (col. 5, lines 43-48):

> The compressible and resilient foam preferably has from 20 to 80 percent of open cells. Preferably, the foam has at least 30 percent open cells, more preferably at least 35 percent open cells, and most preferably at least 40 percent; but preferably no more than 70 percent, more preferably no more than 60 percent, according to ASTM D2856-94.

Grinshpun also recognizes that his flexible and compressible foam sheets are not rigid and thus may need rigid structural support. Grinshpun provides the added support by attaching a "rigid foam backing" to the rear of his flexible and compressible foam sheet. See col. 4, lines 27-42.

Thus, Grinshpun teaches using foam sheets including grooves in which at least a portion of the foam sheet is flexible and resilient, and not rigid. Given that claim 1 requires using a

"rigid cellular insulating material having a substantially uniform rigidity", it is a bit surprising that the Examiner contends that claim 1 lacks novelty over Grinshpun's foam sheets. Appellant will explain how Examiner erred, after first discussing the applicable law.

35 U.S.C. § 102(b) provides in pertinent part:

> A person shall be entitled to a patent unless---
>
> * * *
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for the patent in the United States....

A claim is unpatentable under 35 U.S.C. § 102(b) if a prior art reference expressly or inherently discloses a product including every limitation required by the claim. See Schering Corp. v. Geneva Pharmaceuticals, 339 F.3d 1373, 1379 (Fed. Cir. 2003). A reference expressly anticipates a claim if the reference expressly discloses every limitation in the claim. A reference that does not expressly disclose every limitation in the claim may nevertheless anticipate the claim if the reference inherently discloses the limitation that is not expressly disclosed. But a reference inherently anticipates a claim only if a person of ordinary skill in the art necessarily would obtain the claimed subject matter when practicing the reference. See Ex parte Levy, 17 U.S.P.Q. 2d 1461, 1464 (1990), in which the Patent and Trademark Office Board of Patent Appeals and Interferences explained (emphasis in original):

> In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. In re King, 801 F.2d 1324, 231 USPQ 1 36 (Fed. Cir. 1986); W.L. Gore & Associates , Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983); In re Oelrich, 666 F.2d 578, 212 USPQ 323 (CCPA 1981); In re Wilding, 535 F.2d 631, 190 USPQ 59 (CCPA 1976); Hansirg v. Kemmer, 102 F.2d 212, 40 USPQ 665 (CCPA 1939).

Similarly, the court in In re Oelrich, 666 F.2d 578, 581 (C.C.P.A. 1981) observed (emphasis original):

> Inherency, however, may not be established by probabilities or possibilities. The mere fact a certain thing may result from a given set of circumstances is not sufficient. (Citations omitted).

Grinshpun does not expressly disclose a rigid foam sheet, having slots or grooves, that has a uniform rigidity. Indeed, Grinshpun expressly discloses that at least a portion of his foam sheet is resilient and compressible and, by Grinshpun's explicit definition, not rigid. Thus, Grinshpun does not expressly disclose the insulating member formed of a "rigid cellular insulation material ... having substantially uniform rigidity," as required by claim 1. As a result, Grinshpun does not expressly anticipate claim 1.

Thus, the Examiner's anticipation rejection appears to be grounded in inherency. Grinshpun expressly states that his resilient and compressible foams are not rigid, based on a quantitative test. Grinshpun also teaches that his foams should include a substantial amount (greater than 20% or 30%) of open cells. In contrast, as discussed previously, appellant is using "rigid cellular insulating material" in its ordinary and accustomed sense to mean cellular materials, like foams, that are stiff and inflexible and include only minimal quantities of open cells. However, the Examiner apparently is contending that there is some remote chance that a compressible and resilient foam (as defined by Grinshpun) might inherently overlap with appellant's rigid cellular insulating materials..

But, even assuming that a stiff, inflexible, closed cell foam exists somewhere that would meet Grinshpun's test for compressibility and resiliency, Grinshpun still would not inherently anticipate claim 1. Anticipation by inherency requires that a person practicing Grinshpun would necessarily use a compressible and resilient foam (according to Grinshpun's test) that also qualified as the rigid cellular insulation material required by claim 1. But the mere remote possibility that this theoretically could happen does not come close to meeting the requirements for inherency.

Thus, Grinshpun does not anticipate claim 1 expressly or inherently. As a result, the 35 U.S.C. § 102(b) rejection of claim 1 should be reversed.

(B) Claim 13 would not have been obvious under 35 U.S.C. § 103(a) over Grinshpun in view of Charlson

Claim 13 covers a rigid insulation product that includes the insulating member of claim 1 bonded to a wood member that is "configured so that the wood member will function as a joist header." Basically, the product is a joist header that is pre-insulated.

35 U.S.C. § 103(a) provides in relevant part:

> (a) a patent may not be obtained... if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

The inquiry made to determine whether claimed subject matter would have been obvious under 35 U.S.C. § 103(a), and therefore unpatentable, is well established and requires examining: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations of non-obviousness, such as commercial success, copying of the invention, and long-felt need for the invention. See Graham v. John Deere Co., 383 U.S. 1, 17-18 (1996). But in order to find a claim obvious under 35 U.S.C. § 103(a), the prior art must provide a reason to modify the prior art to obtain the subject matter covered by the claim. See KSR Ind. Co. v. Teleflex, Inc., 127 S. Ct. 1725, 1742 (2007).

Appellant has already discussed Grinshpun. Charlson discloses insulated framing members for buildings. An example of Charlson's framing member is shown in Figure 14, which the Examiner refers to on page 7 of the May 14, 2008 final office action:

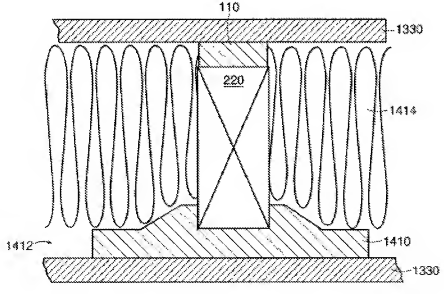

FIG. 14

Figure 14 is a sectional view showing the insulated framing member. Member 220 can be, for example, a stud used in constructing a wall or a joist used in a ceiling to support a floor. Member 220 is enclosed within wallboard/sheathing 1330; insulators 110 and 1440 extend along the length of the member 220.

The Examiner contends that "it would have been obvious… to modify the insulation panel of Grinshpun by bonding a wooden sheathing member [1300 in Figure 14 of Charlson] to its unslotted surface as taught by Charlson." The Examiner apparently believes that by making this combination, the insulation product covered by claim 13 would be obtained. The Examiner is wrong for at least two reasons.

Firstly, even if Charlson's wooden sheathing member is combined with Grinshpun's insulation panel, the rigid insulation product covered by claim 13 would not be obtained. Grinshpun plainly teaches using rigid foam backings as support for flexible and compressible foams that need rigid structural support. A flexible and compressible foam would not need rigid structural support if they themselves were rigid. Thus, even if Charlson's wooden sheathing is substituted for Grinshpun's rigid foam backing, the flexible and compressible foam sheet used with the backing would not be the "rigid cellular insulating material" as required by claim 13.

Secondly, claim 13 requires that the wooden member used in the rigid insulation product "is configured so that the wood member will function as a joist header." The foam sheets described by Grinshpun, like the wood sheathing described by Charlson, are sized to cover the length of entire walls. The wood sheathing is not designed and constructed to function as a joist header and, indeed, cannot function as a joist header.

The Examiner conveniently contends that the limitation "configured so that the wood member will function as a joist header" is a statement of intended use and that therefore "it is given little patentable weight." See page 7 of May 14, 2008 final office action. But the law is clear that limitations of this type count as claim limitations and must be considered in evaluating the scope of the claim. See Pac-Tec, Inc. v. Amerace Corp., 903 F.2d 976, 801 (Fed. Cir. 1990) (functional language in body of claim should not be disregarded). The Examiner is not free to simply ignore a claim limitation.

Thus, the 35 U.S.C. § 103(a) rejection of claim 13 over the combination of Grinshpun and Charlson should be reversed.

(8) Conclusion

For the above reasons, the 35 U.S.C. § 102(b) rejection of claim 1 based on Grinshpun and the 35 U.S.C. § 103(a) rejection of claim 13 based on Grinshpun in view of Charlson should be reversed. The various rejections of the dependent claims should be reversed at least because the relevant base independent claims are patentable.

Please apply the $270.00 appeal brief fee and the $1,175.00 Petition for Five-Month Extension of Time fee and any other charges or credits to Deposit Account No. 06-1050, referencing attorney docket no. 10189-002001.

Respectfully submitted,

Date: April 13, 2009

/Robert C. Nabinger/
Robert C. Nabinger
Reg. No. 33,431

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (877) 769-7945

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Appendix of Claims

1. A rigid insulation product for use in wood frame construction, comprising a single unitary insulating member formed of a single rigid cellular insulating material having substantially uniform rigidity, dimensioned to be mounted lengthwise on a joist header and including a plurality of slots extending width-wise into the single rigid insulating material across one side of the member, each slot being dimensioned to receive an end of a floor joist, the member including a wall, at the base of each slot, having a thickness of at least about 0.375 inch and less than about 1.0 inch, and the member having a thickness, in regions between the slots, of from about 1.0 to about 3.0 inches.

3. The rigid insulation product of claim 1 wherein the member includes a wall, at the base of each slot, of sufficient thickness to provide a thermal break between a floor joist end and a joist header when the product is in use.

4. The rigid insulation product of claim 1 wherein the width of the insulating member is substantially equal to the width of a joist header on which the insulating member will be mounted.

5. The rigid insulation product of claim 1 wherein the slots extend across the entire width of the insulating member.

6. The rigid insulation product of claim 1 further comprising a joist header, bonded to the insulating member on a second side opposite the side having the slots.

7. The rigid insulation product of claim 1 wherein the insulating member comprises an insulating material selected from the group consisting of cellular polystyrene, polyurethane and isocyanurate, other cellular plastics, and cellulose.

8. The rigid insulation product of claim 1 wherein at least some of the slots are dimensioned to receive an end of a wood I-beam.

9. The rigid insulation product of claim 2 wherein the slots are spaced at intervals of about 16 inches.

10. The rigid insulation product of claim 2 wherein the slots are spaced at intervals of about 24 inches.

13. A rigid insulation product for use in wood frame construction, comprising:

a single unitary thermal insulating member comprising a rigid cellular insulating material having substantially uniform rigidity, including a plurality of slots extending width-wise across the member on a first side of the member, each slot being exposed to receive an end of a floor joist; and

a wood member, configured so that the wood member will function as a joist header in a wood frame construction, bonded to the insulating member on a second side of the member opposite the first side.

14. The rigid insulation product of claim 13 wherein the slots are disposed at spaced intervals, the spacing of the slots corresponding to predetermined spacing of floor joists in a wood frame construction.

15. The rigid insulation product of claim 13 wherein the insulating member includes a wall, at the base of each slot, of sufficient thickness to provide a thermal break between a floor joist end and a joist header when the product is in use.

16. The rigid insulation product of claim 13 wherein the width of the insulating member is substantially equal to the width of the wood member.

17. The rigid insulation product of claim 13 wherein the slots extend across the entire width of the insulating member.

18. The rigid insulation product of claim 13 wherein the insulating member comprises an insulating material selected from the group consisting of cellular polystyrene, polyurethane and isocyanurate, other cellular plastics, and cellulose.

19. The rigid insulation product of claim 13 wherein at least some of the slots are dimensioned to receive an end of a wood I-beam.

20. The rigid insulation product of claim 14 wherein the slots are spaced at intervals of about 16 inches.

21. The rigid insulation product of claim 14 wherein the slots are spaced at intervals of about 24 inches.

22. The rigid insulation product of claim 15 wherein the wall has a thickness of at least 0.375 inch.

23. The rigid insulation product of claim 13 wherein the insulating member has a thickness, in regions between the slots, of from about 1.0 to 3.5 inches.

Evidence Appendix

Exhibits 1-4.

Related Proceedings Appendix

None.

EXHIBIT 1

Epoxy.com Product #425

Two-Component Rigid Polyurethane Foam

DESCRIPTION

Epoxy.com Product #425 is a two component, HCFC-141b/water co-blown rigid polyurethane foam system designed for low-density insulation applications. **PRODUCT #425** is typically used for floatation (Boat Foam) inside fiberglass parts. It bonds well to metals, wood and some plastics. This foam system meets Military Specification P-21929B.

MIXING

Epoxy.com Product #425, for best property development, is mixed 1 to 1 by weight. **Epoxy.com Product #425** can be mixed at 1 to 1 by volume it will still foam. Typically **Epoxy.com Product #425** is mixed while being pumped through static mixers. The **Epoxy.com Product #425** can be mixed by hand in small quantity (less than 8 ounces). It can also be mixed by mechanical means such as slow speed drill. Time is critical as the **Epoxy.com Product #425** reacts very fast. Mix completely in 30 seconds and immediately pour in place. Over mixing can affect properties.

STORAGE AND HANDLING

Store between 65-85 °F in dry area. Avoid sunlight, heat and freezing. Keep from moisture, which can create pressure and rupture container. Keep container closed. Empty container has product residue - recondition before reuse. Don't heat or cut with electric or gas torch. Keep waste polyols out of empty drum.

A COMPONENT WARNING! CAUSES IRRITATION. Keep out of eyes. Wear goggles. Avoid skin contact. Wear plastic or

rubber gloves and protective clothing, if splashing is likely. Do not breathe vapor or mist. Keep container closed. Use with adequate ventilation. Wash after handling.

Fluorocarbon Blown Polyol - Store below 70°F. Keep away from direct sun. Cool below 70°F. Open bung carefully. Contents may develop pressure. If cooled below 50°F, gently warm to room temperature before opening. Do not put any waste isocyanates into this empty drum.

Water Blown Polyol - Store between 65-85°F. Keep away from direct sunlight. Open gradually to relieve any pressure build-up. Keep away from moisture. If cooled below 50°F, gently warm to room temperature before opening. Do not put any waste isocyanates into this empty container.

All polyurethane foam burns in varying degrees, which in turn liberates toxic gasses and should be evaluated in its final form for compliance to existing standards in your industry. The information presented herein is based on our own research and that of others and is believed to be correct, however, no warranty is expressed or implied. No statement herein extends any license, either expressed or implied, in connection with any patents issued or pending which may be the property of Stepan or others. The manufacturer shall not be liable (regardless of fault) to the vendee's employees, or anyone for any direct, special or consequential damages arising out of or in connection with the accuracy, completeness, adequacy or furnishings of such information.

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FIRST AID

In case of skin contact, wipe off using a clean cloth soaked with rubbing alcohol, then wash with soap and water. In case of eye contact, immediately flush eyes with water for at least 15 minutes. If breathing is difficult, go to fresh air. Call a physician.

HEALTH AND SAFETY

INFORMATION: "B" COMPONENT WARNING! MAY CAUSE ALLERGIC SKIN OR RESPIRATORY REACTION. Vapor, mist and decomposition products are harmful, can be highly toxic and irritating. Avoid eye contact or prolonged or repeated skin contact. Don't breath smoke or gases from overheated material. Use only with adequate ventilation or respirator. If spilled on clothes or shoes, remove and clean before reuse.

Typical Foam Properties

Density ASTM D-1622	
Molded, overall pcf	3.4
Core, pcf	2.7
Yield cu.ft./gal.	3.0 ±
Compressive Strength, 10% deflection, ASTM D-1621	
Parallel, psi	25.3
Perpendicular, psi	30.5
Compressive Strength Change, Mil-P-21929B, % change	2.35
Initial K-Factor, ASTM C-518, BTU in/hr ft<=	0.141
Shear Strength, psi ASTM C-273	31.0
Tensile Strength, psi ASTM D-1623	51.9
Water Absorption	
ASTM D-2842, lb/ft<=	0.083
% by volume	4.7
Tumbling Friability, ASTM C-421 % loss	11.1 "B" Component, polyol blend

Closed Cell Content ASTM D-2856, %	95
Compression Set, Mil-P-21929B, % loss	0.97
Oil Resistance ASTM D-471, Mil-P-21929B	Pass

Dimensional Stability
ASTM D-2126, % volume change:

	@ -20°F	@158°F	@158°F 100% R.H.	@ 100°F 100% R.H.
1 day	0.2	0.3	5.3	1.3
7 days	0.1	1.0	7.0	2.1
14 days	0.2	1.5	7.9	2.5
28 days	0.3	1.8	8.9	3.5

Typical Component Properties

	"A" Component, polymeric MDI	"B" Component, polyol blend
Viscosity @ 25° C, cps	200	400
Specific Gravity @ 25° C	1.24	1.12
Mixing Ratio, % by weight	50	50

Typical Component Properties:

Hand Mix Reactivity @ 25°C	
Cream Time, seconds	24
String Time, seconds	90

Packaging: 10 gallon unit consisting of 5 gallons of "A" and 5 gallons of "B".

FOR INDUSTRIAL USE ONLY. KEEP AWAY FROM CHILDREN

[redacted]

Proper mixing and installation is critical to the optimal success of all product. See Installation Tips, Techdata, & MSDS for more details on our products. Be sure to contact us with any questions and/or concerns that you have.

For more information please contact:

Epoxy.com
A Division of Epoxy Systems, Inc
20774 W. Pennsylvania Ave.
Dunnellon, Florida 34431
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Florida & Vermont
USA

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321-206-1833 Customer Service - Ordering and Order Status
Katey Fontaine, VP - Customer Service Director
sales@epoxy.com

714-657-3826 Technical Support
Norm Lambert, President - Technical Support Director
info@epoxy.com

352-489-1666 Accounting and Administration
Debby Lambert, CEO, and CFO
office@epoxy.com

352-489-1625 Fax line to all Departments
www.epoxy.com

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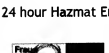

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ISO TC 61/SC 10 N 1069

Date: 2003-09-29

ISO/WD 8873-1

ISO TC 61/SC 10/WG 10

Secretariat: SCC

Rigid cellular plastic — Spray polyurethane foam medium density — Part 1: Specification

Élément introductif — Élément central — Partie 1: Titre de la partie

Warning

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Document type: International Standard
Document subtype:
Document stage: (20) Preparatory
Document language: E

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EXHIBIT 2

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EXHIBIT 2

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 8873-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 10, *Cellular plastics*.

This second edition cancels and replaces the first edition, clauses, subclauses and tables of which has been technically revised.

ISO 8873 consists of the following parts, under the general title *Rigid cellular plastic — Spray polyurethane foam medium density*:

— *Part 1: Specification*

— *Part 2: Application and Installation:*

— *Part 3: Test methods*

Introduction

ISO 8873 defines the requirements for rigid cellular plastic spray polyurethane foam when used as a thermal insulation in buildings.

This part of ISO 8873 specified requirements for physical properties of rigid cellular plastic spray polyurethane foam and lists the test methods to be used.

The designer has the responsibility for confirming that the physical properties provided by material manufactured to this part of ISO 8873 will provide the requirements need for a specific application.

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Rigid cellular plastic — Spray polyurethane foam medium density — Part 1: Specification

1 Scope

This part of ISO 8873 specifies minimum requirements and test methods for spray-applied polyurethane rigid cellular plastic - medium density, used as a thermal insulation for both building and non-building applications, whether applied on a building site or in a prefabrication (manufacturing) facility. The material is also known as foamed in-situ insulation.

The spray-applied polyurethane rigid cellular plastic - medium density thermal insulation shall not be used when the continuous service temperature of the substrate is outside the range of -60 to +80 °C.

The test methods used to determine the material properties provide a means of comparing different cellular plastic thermal insulations. They are intended for use in specifications, product evaluations and quality control. They are not intended to predict end-use product performance.

Spray-applied polyurethane rigid cellular plastic - medium density must be applied (installed) in accordance with the manufacturer's instructions and ISO 8873-2 Rigid cellular plastic – Spray polyurethane foam medium density – Application and Installation. Applications, requirements for applications and limitations of use are included in the ISO 8873-2 Standard.

The testing and evaluation of a product against this International Standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this Standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any existing applicable regulatory requirements prior to its use.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 291, Plastics — *Standard atmosphere for conditioning and testing*

ISO 844, Rigid cellular plastics — *Determination of compressive properties*

ISO 845, Cellular plastics and rubbers — *Determination of apparent (bulk) density*

ISO 1663, Rigid cellular plastics — *Determination of water transmission properties*

ISO 1926, Rigid cellular plastics — *Determination of tensile properties*

ISO 2796, Rigid cellular plastics — *Test for dimensional stability*

ISO 2896, Rigid cellular plastics — *Determination of water absorption*

ISO 4590, Rigid cellular plastics — *Determination of volume percentage of open and closed cells*

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ISO 8301, Thermal insulation — *Determination of steady state thermal resistance and related properties – Heat flow apparatus*

ISO 8302, Thermal insulation — *Determination of steady state thermal resistance and related properties – Guarded hot box apparatus*

ISO 8873-2, Rigid cellular plastics — *Part 2: Application and installation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
authority having jurisdiction
Representative of a government agency predominantly involved in regulating by statute the use of products, materials and services

3.2
certification organization
An impartial body possessing the necessary competence and reliability to operate a certification system in which the interests of all parties concerned with the functioning of the system are represented

3.3
chemical components manufacturer
A manufacturer / supplier of the liquid chemical components, polyisocyanates and a polyhydroxyl blends containing also flame retardants, blowing agent and catalysts (system), which are designed to be mixed and sprayed to form rigid polyurethane foam insulation material in situ.

3.4
equipment manufacturer
Manufacturer of equipment designed for spray-application of rigid polyurethane cellular plastic thermal insulation

3.5
foamed in-situ insulation
Material or mixture of materials sprayed or injected in a liquid state to form a rigid or semi rigid foam

3.6
spray polyurethane foam medium density
Rigid cellular plastic material that is formed in place by the catalyzed reaction of polyisocyanates and polyhydroxyl compounds, expanded with blowing agents and producing a predominantly closed cell product that has a density, which will produce a compressive strength between 170 kPa and 280 kPa.

3.7
spray polyurethane foam contractor
The individual, organization or corporation who is responsible for all requirements and obligations for the installation of the product.

3.8
spray polyurethane foam installer
The individual or worker who applies the chemical components by mixing and spraying them to form the rigid cellular plastic spray polyurethane foam product. The installer is responsible for the actual installation and site requirements identified by the manufacturer and/or the ISO 8873-2 Standard for application of the product. The installer shall be trained, and qualified as having demonstrated the

required knowledge for proper application of the product by a Certification Organization (CO). The installer shall follow the requirements for installation and the obligations for installers identified by the manufacturer, the application standard ISO 8873-2

4 Requirements

4.1 General Requirements

Rigid cellular plastic spray polyurethane foam thermal insulation shall be installed by a Spray Polyurethane Foam Contractor using a Spray Polyurethane Foam Installer in accordance with ISO 8873-2 Rigid cellular plastic – Spray polyurethane foam medium density – Application and Installation and the instructions given by the chemical manufacturer.

When applied the rigid polyurethane cellular plastic thermal insulation shall not present a health hazard to the potential occupants nor shall the cured insulation have any residual odour.

Special applications may require properties other than, or in addition to, those specified in this specification. These properties, when agreed upon by the interested parties, may be added to the requirements of this specification.

When stored in accordance with the chemical manufacturer's instructions and applied as given in Clause 4.1.1 and within the shelf life of the chemicals as declared by the manufacturer, the chemical components shall produce an insulation that meets the requirements of this Specification.

4.2 Detailed Requirements

Rigid cellular plastic spray polyurethane foam thermal insulation shall conform with the following requirements specified in Table 1 when installed in accordance with 4.1.1.

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TABLE 1

4.3 REQUIREMENTS FOR PHYSICAL PROPERTIES

Property	Unit	Requirements		Test Method
		Min.	Max.	
Air Permeance (Mandatory material only testing)	l/s @ 75Pa	-	.02	Clause 6.1
Apparent Core Density	kg/m³	28	-	Clause 6.2
Compressive Strength	KPa	170	-	Clause 6.3
Dimensional Stability Volume Change at: -20°C 100°C 70°C, 97 ± 3% RH	 % % %	 - - -	 - 1 +10 + 14	Clause 6.4
Surface Burning Characteristics Flame Spread	 -	 -	 500	Clause 6.5
Open Cell Content, Volume	%	-	8	Clause 6.6
Initial Thermal Resistance – 50mm sample after a minimum of 2 d and a maximum of 14 d at 23 ±2°C	m² · °C/W	2.5		Clause 6.7
Long Term Thermal Resistance for a 50 mm thick specimen	m² · °C/W	2.0		Clause 6.8
Tensile Modulus	kPa	200	-	Clause 6.9
Volatile Organic Emissions	-	Pass	-	Clause 6.10
Water Absorption by Volume	%	-	4	Clause 6.11
Water Vapour Permeance for a 50 mm thick specimen	ng/Pa · s · m²	-	60	Clause 6.12

Note 1: The test methods used to determine the material properties provide a means of comparing different cellular plastic thermal insulations. They are intended for use in specifications, product evaluations and quality control. They are not intended to predict end-use product performance.

5 Sampling

Random sampling shall be carried out by a third party company according to provisions stipulated by the certification agency, purchaser or as described in this product specification.

Sampling shall be done according to ISO XXX by a third party organization or as agreed to between the manufacturer and the purchaser.

For testing purposes, select at random an unopened container of each component material and store within the temperature range of 13°C to 21°C (or as specified on the containers) until a period of two weeks before the end of shelf life as declared by the manufacturer prior to the preparation of the sample panels. Unless otherwise specified, the frequency of testing and the number of sample panels shall be left to the discretion of the inspection authority.

5.1 Preparation of sample panels

Samples of rigid polyurethane cellular plastic thermal insulation panels that are representative of the end product shall be prepared by a licensed installer (specified in Clause 4.1). Specimens used for testing shall be cut from these sample panels using a band saw or similar equipment.

Unless otherwise specified in the test method, the sample panels shall be made by spraying the product on a 16 mm thick polyethylene board to obtain the manufacturer's declared foam density. A single batch (lot) of material shall be used to produce an entire set of sample panels required to produce individual specimens in the size required by the testing laboratory to conduct all of the tests. The finished sample panels shall have a minimum thickness of 60 mm [containing only one (1) skin (pass line)]. To achieve a single skin within the foam, the sample panel shall be prepared in two passes, with each pass having a minimum thickness of 30 mm and a maximum thickness of 40 mm, unless otherwise specified in the test method. The ambient temperatures (in the area where the sample panels are produced) and the substrate temperature shall be (23 ± 2)°C and the ambient relative humidity shall not exceed 80%, unless otherwise specified and so reported. The size of the foam sample panels shall be a minimum of 1 m x 1 m.

The manufacturer shall use a single batch (lot) of material, which represents the material specification requirements used in their Quality Control Program. All tests for the physical properties shall be carried out using foam specimens cut from the same sample panels, sprayed using a single batch (lot), which has been formulated and installed in order to represent the installed foam density required by the manufacturer.

5.2 Conditioning of Sample Panels

Unless otherwise specified, sample panels (with the polyethylene board still attached to the foam) shall be conditioned in accordance with ISO 291 at, 88 h at (23 ± 2)°C, (50 ± 5)% RH prior to cutting and testing for physical properties.

5.3 Preparation of Specimens

Specimens shall be cut from the sample panels described in Clause 5.2.2. All specimens cut from the sample panels shall have been produced from the same batch (lot) of material for all of the testing. Unless specified otherwise, specimens shall be 50 mm thick and shall contain one pass line (internal skin) within the specimen for all specimens required for testing purposes. All specimens shall be obtained from the conditioned sample panels by removing foam specimen from the polyethylene board and cutting the specimen to size required by the testing equipment. The one external skin (opposite to the polyethylene board) shall be removed to produce a flat specimen. The skin that was produced by the polyethylene board is to be left intact.

Note: The testing laboratory is to check flatness of the specimens to determine acceptability before using. All measurements shall be determined in the "flat" position.

6 Test methods

6.1 Air Permeance

Determine the air permeance in accordance with ISO 8873 Rigid cellular plastics – Spray polyurethane foam medium density – Part 3: Test methods on a 1 m x 1 m specimen. A minimum of five specimens should be tested over a range of 6 pressure differences from 50 to 500 Pa. The air leakage rate at 75Pa shall be taken from the linear regression line (r2=0.99) of the 30 data points. The specimen for testing shall be prepared in accordance with the ISO 8873-3 International Standard.

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6.2 Apparent Core Density

Determine the apparent core density in accordance with ISO 845 using at least five core specimens. The specimen used for apparent core density shall be obtained from the top pass and shall not contain any pass lines.

6.3 Compressive Strength

Determine the compressive strength in accordance with ISO 844, using five core specimens measuring 150 x 150 x 50 mm each.

6.4 Dimensional Stability

Determine the dimensional stability in accordance with ISO 2796, except that the conditioning time shall be 14 d at (23 ± 2)°C and (50 ± 5)% R.H. Measure the dimensional changes after the 50 mm thick specimens have been exposed to the following conditions (use at least three specimens for each exposure condition):

28 d at (–20 ± 3)°C, ambient humidity;

28 d at (100 ± 3)°C, ambient humidity;

28 d at (70 ± 3)°C, (97 ± 3)% R.H.

Report the percentage volumetric change obtained for each exposure. Express the results as a "plus %" when there has been expansion and as a "minus %" when there has been shrinkage.

6.5 Surface Burning Characteristics

Determine the surface burning characteristics of the insulation in accordance with requirements of the authority having jurisdiction.

6.6 Open-Cell Content Volume

Determine the open-cell content volume as the average of the measurements according to ISO 4590 using three 25 mm^3 core specimens.

6.7 Initial Thermal Resistance

Determine the thermal resistance for a 50 mm specimen in accordance with ISO 8301 or ISO 8302 at a standard mean temperature of 24°C and a temperature differential of (22 ±2)°C. Optionally, thermal resistance may be determined at other additional designated mean temperatures (-4°C, 4°C, 44°C), In cases of dispute use ISO 8301. Report the density of the tested specimens.

Thermal Resistance per Unit Thickness – Determine the thermal resistance on at least three specimens 50 mm thick after a minimum of 2d and a maximum of 14 days at (23 ±2)°C. Report the density of the tested specimens.

6.8 Long Term Thermal Resistance (LTTR)

All cellular plastic insulations manufactured with the intent to retain a blowing agent, other than air, for a period longer than 180 days, shall be tested for long-term thermal resistance (LTTR) in accordance with ISO 8873-3. When measuring the thermal resistance, the mean temperature shall be with a temperature difference across the specimen of (22 ±3)°C.

This thermal resistance value shall be the design thermal resistance value for purposes of energy calculations.

The LTTR value depends on material thickness. The LTTR shall be determined and reported for 25, 50 and 75 mm products. From the above data points, LTTR values can be determined for products from 12 mm to 100 mm. Other thickness may be tested and reported. The value determined must meet the minimum requirement listed in Table 1.

6.9 Tensile Modulus

Determine the tensile adhesive strength in accordance with ISO 1296, using a minimum of five specimens perpendicular to flat insulation surface.

6.10 Volatile Organic Emissions

For formulations intended for use in inhabited spaces the volatile organic compound emissions from the applied cellular plastic are to be tested and health hazards evaluated in accordance with the appropriate methods selected by following the guidelines given in ISO 8873-3.

The volatile organic compound emissions shall be determined and their health hazards evaluated in accordance with the appropriate methods selected by following the guidelines in ISO 8873.

The volatile organic compound emissions for the cellular plastic shall not exceed the limits stated in Table 1.

TABLE 2

Permissible concentration in indoor air of possible volatile organic emissions from Rigid cellular plastic – Spray polyurethane foam Thermal insulation

Compound	Maximum Concentrations in Indoor Air	
	mg/m^3	ppm
Acetaldehyde	1.80	1.0
Dichlorofluoromethane	0.42	0.1
Dichlorofluoroethane	3.83	0.8
Trichlorofluoromethane	56.2	10.0
Chloroform	0.49	0.1
α-Methylstyrene	2.42	0.5
Chlorobenzene	0.46	0.1
1,4 Dioxane	0.90	0.25
Toluene	3.77	1.0
1,2,4 Trimethylbenzene	1.23	0.25

6.11 Water Absorption

Determine the water absorption in accordance with ISO 2896 – 96-hour immersion method, using at least three specimens 150 mm x 150 mm x 50 mm each.

EXHIBIT 2

6.12 Water Vapour Permeance

It was established (A.3.4) that the surface skins created when SPF is applied to a rigid substrate have a substantial effect on water vapour transmission through the spray polyurethane foam. Furthermore, it was shown the same foam product exhibits different water vapour permeance when sprayed on different substrates. Two different types of substrates were examined, a non-hygroscopic material (such as concrete block) and a hygroscopic material (such as plywood or a gypsum sheet). These results show that to satisfy the requirement of water vapour permeance of 60 ng/(Pa.s.m^2) a 50-mm thick layer is needed if the medium density SPF is sprayed on a gypsum board. Yet, a 20-mm thick layer of the same foam is sufficient when the foam is sprayed on the concrete block.

To prove compliance with the requirement for water vapour permeance listed in Table 1, the specimen for testing shall be prepared in the same manner as described in section 5.2 except that it will be sprayed on a sheet polyethylene surface. After period of curing, the polyethylene should be gently removed to leave the bottom surface intact , while the top surface of the sample shall be removed to achieve the total thickness of (50 $\pm$ 1) mm.

Three specimens shall be prepared from the sample described in section 5.5.12.2 and tested at temperature of (23 $\pm$ 2) °C in accordance with ISO 1663. The mean value from these three specimens shall be reported as the test result.

Performing test specified in section 5.5.12.3 may require a period of several weeks. Alternatively, a rapid test can be performed on 13 $\pm$ 1 mm thick core specimen. The water vapour permeance value obtained from the core specimen, which neither include internal skin at the successive spray pass boundaries nor the external skin created in contact with the substrate, is, however, quite different. A value of water vapour permeance less than 300 ng/ (Pa.s.m^2) obtained as an average of values obtained on three test specimens implies that if a specimen was prepared in the manner described in section 5.5.12.2 it would have the permeance of 60 ng/ (Pa.s.m^2) or less.

A thin layer core test (section 5.5.12.4) is required when the test of water vapour permeance on 50-mm thick foam is made for the first time. Having these two tests performed on the same sample permits using the rapid test in subsequent qualification of the foam system.

7 Reporting Requirements

Test data shall be reported in the form of a table with property, result and pass/fail columns including results for all properties listed in the Specification followed by a statement on whether the product met the requirements of the Specification. Other optional properties may be tested and reported in a similar manner if requested by the manufacturer or supplier.

In addition to the information specified in the individual test methods, all reports describing the testing of the thermal insulation in accordance with the Specification shall include the following information.

- The chemical manufacturer's name, address, production facility address and product designation
- The type and name of product and other product description;
- Lot number and manufactured date;
- Information about sampling;
- Description of thermal resistance test apparatus, calibration standards used and their source;
- Name and location of laboratory performing the tests and the accreditation agency for the laboratory;
- Report of all test results according to the test methods and apparent core density of the specimen;

- Summary of measured results compared to, the requirements of this standard with indication that the property has passed / failed;
- Declaration of conformity with this Standard;
- When follow-up testing is required, the agency conducting the sampling must be identified and if the sampling was unannounced and at random, and;
- An appendix to the report shall contain the data used to generate the above items.

8 Marking, labelling and packaging

8.1 Packaging

Unless otherwise specified, the liquid components shall be packaged in the manufacturer's standard containers or transported in bulk.

8.2 Marking and/or Labelling

8.2.1 Marking for Identification of Manufacturer

Each manufacturer/ supplier shall determine a means by which their product, after being sprayed, easily and uniquely identified on the job site as being their product, which the manufacturer declares, meets the ISO 8873-1 International Standard. (An example of a manufacturer's marking could be a distinct ink colour added, or a material added to their system, which could be identified at the installation site). Additional requirements for identification of the installed product by use of a job site label is required by the application standard ISO 8873-2 – Rigid cellular plastic - Spray Polyurethane Foam, Medium Density – Application and installation.

8.2.2 Labelling

Each liquid component container shall be clearly identified as either polyisocyanate component ("A") or resin component ("B"). Unless otherwise specified, each container shall be marked with the

- manufacturer's name
- product name
- type of material (e.g. insulation)
- net mass of the contents of the packaged material
- country of manufacturer
- lot number
- manufacturer date
- "use before" date
- the means to identify their installed product, and,
- "ISO 8873-1".

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9 MANUFACTURER'S DOCUMENTATION

The manufacturer (supplier) shall provide the Licensed Contractor with a minimum of the following :

- a description of the chemical components including their properties;
- a material safety data sheet for each component;
- instructions for safe handling, use and disposal of the chemical components;
- type of operation of spray equipment and operation parameters;
- ambient temperature limitations at application;
- temperature, type and preparation of substrate;
- physical properties of the insulation;
- limitations for use of the insulation;
- shelf life of the components, and
- method used by the manufacturer to identify installed spray polyurethane foam insulation on site that the manufacturer declares meets the ISO 8873-1 International Standard.

EXHIBIT 3

rigid

One entry found.

On Off

Main Entry: **rig·id**
Pronunciation: \ri-jad\
Function: *adjective*
Etymology: Middle English *rigide*, from Latin *rigidus*, from *rigēre* to be stiff
Date: 15th century

1 a : deficient in or devoid of flexibility <*rigid* price controls> <a *rigid* bar of metal> **b** : appearing stiff and unyielding <his face *rigid* with pain>
2 a : inflexibly set in opinion **b** : strictly observed <adheres to a *rigid* schedule>
3 : firmly inflexible rather than lax or indulgent <a *rigid* disciplinarian>
4 : precise and accurate in procedure <*rigid* control of the manufacturing process>
5 *of an airship* : having the outer shape maintained by a fixed framework
— rig·id·ly *adverb*
— rig·id·ness *noun*

synonyms RIGID , RIGOROUS , STRICT , STRINGENT mean extremely severe or stern. RIGID implies uncompromising inflexibility <*rigid* rules of conduct>. RIGOROUS implies the imposition of hardship and difficulty <the *rigorous* training of recruits>. STRICT emphasizes undeviating conformity to rules, standards, or requirements <*strict* enforcement of the law>. STRINGENT suggests severe, tight restriction or limitation <*stringent* standards of admission>.
synonyms see in addition STIFF

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EXHIBIT 3

EXHIBIT 4

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What does rigid mean? we found 1 entry for the meaning of **rigid**

Rigid \Rig"id\, a. [L. rigidus, fr. rigere to be stiff or numb: cf. F. rigide. Cf. Rigor.]

1. Firm; stiff; unyielding; not pliant; not flexible.

Upright beams innumerable Of rigid spears. --Milton.

2. Hence, not lax or indulgent; severe; inflexible; strict; as, a rigid father or master; rigid discipline; rigid criticism; a rigid sentence.

The more rigid order of principles in religion and government. --Hawthorne.

Syn: Stiff; unpliant; inflexible; unyielding; strict; exact; severe; austere; stern; rigorous; unmitigated.

Source: Webster's Revised Unabridged Dictionary (1913)

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